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(54) Vehicle-mounted charging apparatus for a portable telephone set

(57) The charger 17 has a microcomputer 111 which controls the level of current provided by a supply circuit 18, 19, 20 in dependence on data received from the telephone set 11 indicative of the type of battery 12 connected and of whether the telephone set is in a communicating or non-communicating state. The current provided by circuit 18, 19, 20 is thereby established at a level sufficient not only to charge battery 12 but also to operate the telephone set when in a communicating state. This avoids use of separate charging and telephone operating current supply circuits in charger 17 and also avoids use of an internal/external power supply detector switch (25), (Fig 2), in the telephone 11. Telephone 11 has an internal circuit 14 with a microcomputer which supplies communicating/non-communicating state data to the charger microcomputer 111 and may also supply the battery type data; alternatively microcomputer 111 may receive battery type data from a terminal 13 of the battery 12.

FIG. 1

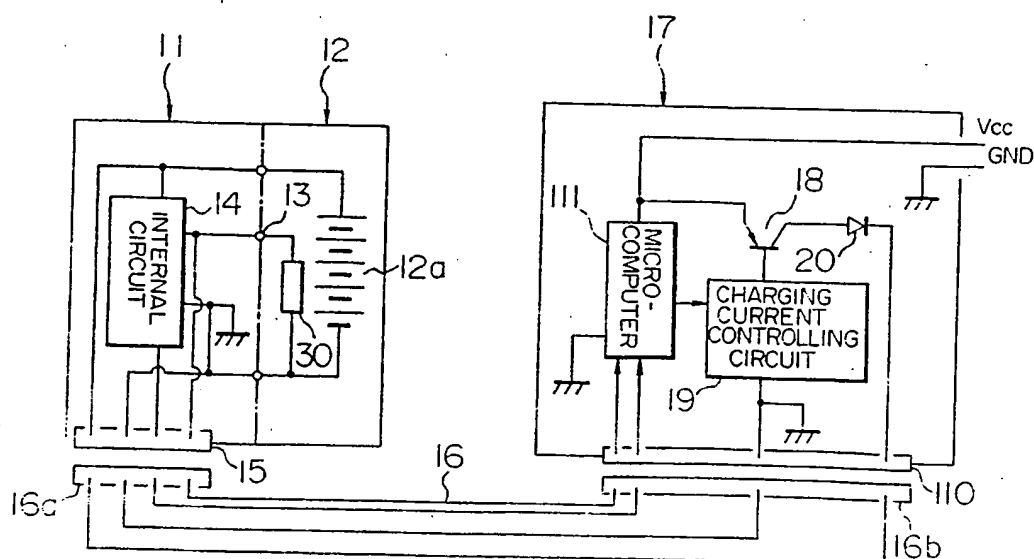
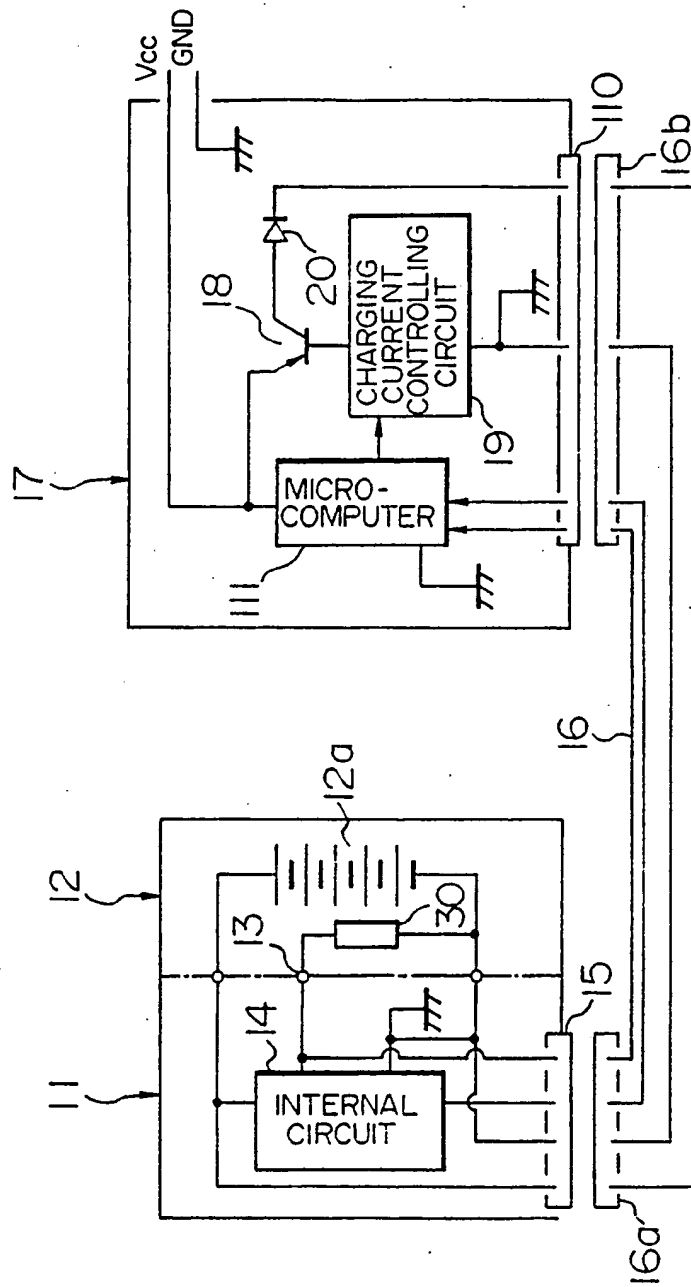


FIG. 1



## VEHICLE-MOUNTED CHARGING APPARATUS

## FOR PORTABLE TELEPHONE SETS

## 1 BACKGROUND OF THE INVENTION

The present invention relates to a vehicle-mounted charging apparatus for portable telephone sets for use as a public communication device.

5 Fig. 2 shows the structure of a conventional vehicle-mounted charging apparatus. In Fig. 2, reference numeral 21 denotes a portable telephone set to which a selected one of a plurality of battery packs 22 is attachable, each thereof containing a battery 22a.

10 The plurality of battery packs have the same number of cells and are different in capacity from each other. A battery pack 22 presently in use is discriminated by the portable telephone set 21 or a vehicle-mounted charger 28 described later through a battery discrimination

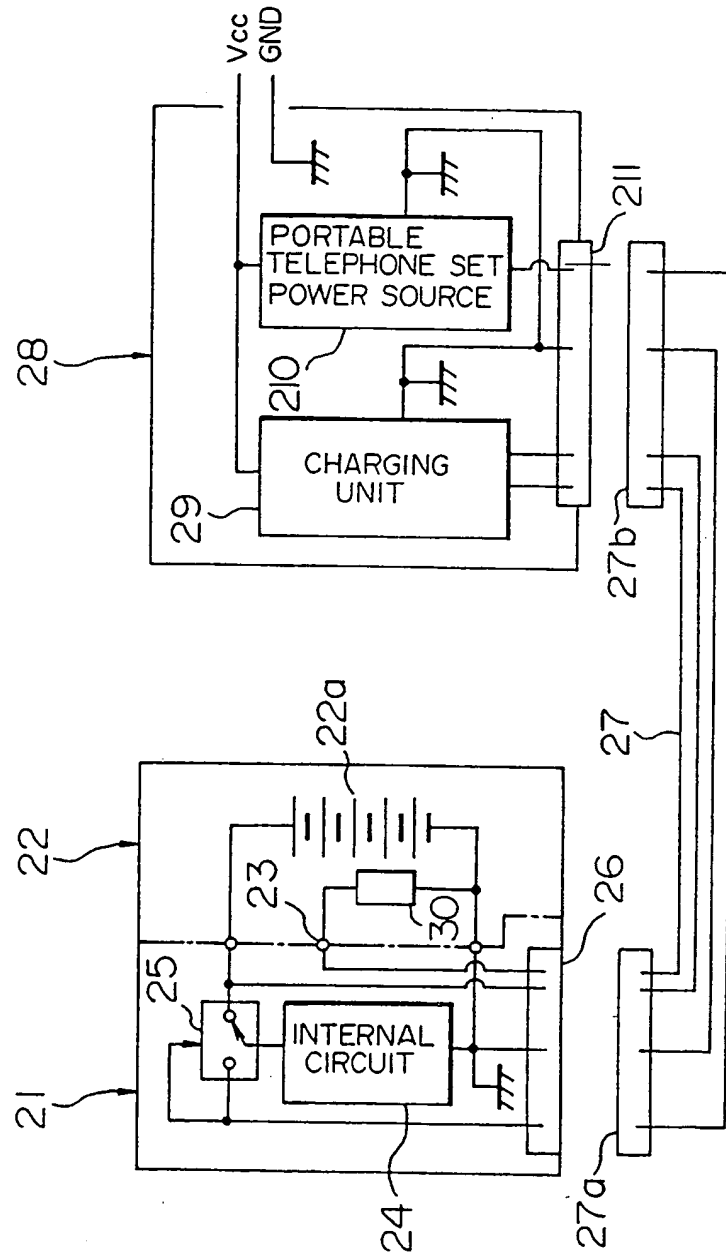
15 terminal 23 connectable to a battery discrimination unit 30.

Reference numeral 24 is an internal circuit provided within the portable telephone set 21; 26, an external connector attached to the telephone set 21; and

20 25, a changeover switch provided within the telephone set 21 which is switched between connection to a portable telephone set power source 210 and connection to a power source in the battery pack 22. Thus, the portable telephone set 21 is composed of the internal

25 circuit 24, external connector 26, changeover switch 25,

FIG. 2  
PRIOR ART



1 and battery discrimination terminal 23 connectable to  
the battery discrimination unit 30.

Reference numeral 28 denotes a vehicle-mounted  
charger composed of a charging unit 29, portable tele-  
5 phone set power source 210, and external connector 211.  
The vehicle-mounted charger 28 is supplied with a  
voltage  $V_{cc}$  from a vehicle-mounted battery (not shown).  
Reference numeral 27 denotes a connection cable with  
connectors 27a and 27b attached to its respective ends.  
10 The connector 27a is connected to the external connector  
26 of the portable telephone set 21, while the connector  
27b is connected to the connector 211 of the vehicle-  
mounted charger 28. In place of the cable 27, the  
connectors 26 and 211 may be directly connected with  
15 each other.

The operation of the conventional apparatus  
will be described. In Fig. 2, when the portable  
telephone set 21 is used by itself, it is supplied with  
power from the battery pack 22. When the vehicle-  
20 mounted charger 28 is connected to the telephone set 21  
through the connection cable 27, the telephone set 21  
detects the connection of the cable, the changeover  
switch 25 is switched to the external power source side,  
and the telephone set 21 is supplied with power from the  
25 portable telephone set power source 210. Simultane-  
ously, the battery pack 22 is connected to the charging  
unit 29 to start charging thereof. The battery discrim-  
ination terminal 23, which is used to determine the kind

1 of the battery pack 22, is also connected to the  
charging unit 29, which changes its charging current in  
accordance with information from the battery discrimi-  
nation terminal 23.

5 As described above, since the conventional  
vehicle-mounted charging apparatus is provided with the  
charging unit 29 and portable telephone set power source  
210, it can charge the battery pack 22 while operating  
the portable telephone set 21.

10 However, since the conventional vehicle-  
mounted charging apparatus is provided with the charging  
unit 29 and the portable telephone set power source 210,  
both of which are contained in the charger 28, the  
charger 28 itself cannot be miniaturized.

## 15 SUMMARY OF THE INVENTION

The present invention is intended to solve  
such a problem. Thus, it is an object of the present  
invention to provide a miniaturized vehicle-mounted  
charging apparatus for a portable telephone set.

20 In order to achieve the above object, in a  
vehicle-mounted charging apparatus for a portable  
telephone set according to the present invention, the  
portable telephone set comprises an internal circuit  
which, in turn, comprises a microcomputer. A vehicle-  
25 mounted charger for the telephone set comprises a  
microcomputer. When the charger is connected to the  
telephone set, the microcomputer in the internal circuit

1 of the telephone set delivers information on the type of  
a battery pack and information on the communication  
on/off state of the telephone set to the microcomputer  
in the vehicle-mounted charger so that the microcomputer  
5 in the charger may control a charging current to the  
battery pack connected to the telephone set in accord-  
ance with the operating state of the telephone set,  
thereby performing floating charging.

Therefore, the vehicle-mounted charging  
10 apparatus for a portable telephone set of the present  
invention uses the vehicle-mounted charger for charging  
the battery pack also as the power source for the  
portable telephone set, to thereby realize a single  
system power source in the vehicle-mounted charger. In  
15 addition, the common external power source connection  
terminal is shared by the portable telephone set and the  
battery pack, so that the provision of an element such  
as the changeover switch in the portable telephone set  
can be omitted advantageously.

## 20 BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a schematic block diagram of a  
vehicle-mounted charging apparatus for a portable  
telephone set of a first embodiment of the present  
invention.

25 Fig. 2 is a schematic block diagram of a  
conventional vehicle-mounted charging apparatus.

1 DESCRIPTION OF THE PREFERRED EMBODIMENT

Fig. 1 shows the structure of a first embodiment of the present invention. Referring to Fig. 1, reference numeral 11 denotes a portable telephone set to which a battery pack 12 containing a battery 12a is adapted to be connected. A battery pack is selected among plural kinds of larger and smaller battery packs 12 which have the same number of cells, respectively, and are different in capacity from each other.

10 Reference numeral 13 denotes a battery discrimination terminal which is connectable to an battery discrimination unit 30, and connected to an internal circuit 14 and an external connector 15, and which will be described later in more detail. The terminal 13 is used to transmit therethrough information on the kind of the battery pack 12 currently in use to the internal circuit 14. The internal circuit 14 has a built-in microcomputer (not shown), which is constructed to discriminate the kind of one of a plurality of battery packs 12 through the battery discrimination terminal 13.

Reference numeral 15 denotes an external connector which is connected to the battery discrimination terminal 13 and the internal circuit 14, and which is attached to the portable telephone set 11. Thus, the telephone set 11 is composed of the battery discrimination terminal 13 connectable to the battery discrimination unit 30, internal circuit 14 and external



1 connector 15.

Reference numeral 17 denotes a vehicle-mounted charger for charging the battery pack 12. Reference numeral 18 denotes a driver transistor having an emitter  
5 impressed with a voltage  $V_{cc}$  from a vehicle-mounted battery (not shown), a collector connected to an external connector 110 attached to the charger 17 through a reverse current preventing diode 20, and a base connected to the output terminal of a charging  
10 current controlling circuit 19. A charging current flows from the driver transistor 18 through the diode 20 to the battery 12a in the battery packs 12.

The charging current controlling circuit 19 controls a current supplied to the internal circuit 14  
15 of the telephone set 11 and a charging current supplied to the battery 12a in the battery pack 12, and it is connected to the external connector 110. Reference numeral 111 denotes a microcomputer built in the vehicle-mounted charger 17 and supplied with a voltage  
20  $V_{cc}$  from the vehicle-mounted battery. The microcomputer 111 transfers/receives data to and from the micro-computer in the internal circuit 14 of the portable telephone set 11, and controls the charging current controlling circuit 19 and the driver transistor 18.  
25 The microcomputer 111 is also connected to the external connector 110. Thus, the vehicle-mounted charger 17 is composed of the driver transistor 18, charging current controlling circuit 19, external connector 110 and

1 microcomputer 111.

Reference numeral 16 denotes a connection cable with connectors 16a and 16b attached to its respective ends. The connector 16a is connected to the external connector 15 of the portable telephone set 11, while the connector 16b is connected to the external connector 110 of the vehicle-mounted charger 17. The battery discrimination terminal 13 may be directly connected to the vehicle-mounted charger 17.

10 The operation of the first embodiment will be described next. In the first embodiment, the telephone set 11 and the battery pack 12 are connected to each other, and the connectors 16a and 16b of the cable 16 are connected to the external connectors 15 and 110, respectively, to thereby connect the telephone set 11 and the charger 17 with each other. The microcomputer built in the internal circuit 14 discriminates the kind of the battery pack 12 through the battery discrimination terminal 13. This information is transmitted as serial data from the internal circuit 14 through the external connector 15, connector 16a, cable 16, connector 16b, and external connector 110 to the microcomputer 111 in the charger 17.

25 The microcomputer 111 receives this information and controls the charging current controlling circuit 19 and the driver transistor 18 on the basis of the received information to thereby set a charging current suitable for a larger battery or a smaller

1 battery, respectively. The information on the kind of  
the battery may be directly sent from the battery  
discrimination terminal 13, external connector 15,  
connector 16a, connection cable 16, connector 16b, and  
5 external connector 110 to the microcomputer 111.

A current consumed in the internal circuit 14  
is larger than a charging current to be supplied to a  
smaller battery in the battery pack 12 when the  
telephone set 11 is in operation. Thus, if this state  
10 continues, the battery pack 12 is discharged, without  
being charged any more. Therefore, the internal circuit  
14 also transmits information on the operating state of  
the portable telephone set 11 to the microcomputer 111,  
which then makes a decision on the information and  
15 controls the charging current controlling circuit 19 and  
hence a charging current to the battery pack 12. Table  
1 below shows the charging currents in the respective  
conditions of the telephone set.

Table 1

State of the portable telephone set	Charging current	
	Smaller battery connected	Larger battery connected
Communicating	Large	Large
Not communicating	Small	Large

As described above, according to the first  
20 embodiment, even if any one of the larger and smaller  
battery packs 12 is connected to the telephone set 11,

1 an appropriate charging current is selected. Even when  
the telephone set 11 is in any one of the on and off  
states, a sufficient charging current can be supplied,  
and thereby complete floating charging can be performed.

5 According to the first embodiment, satisfactory floating charging is performed under the condition that a load and the vehicle-mounted charger 17 are directly connected with each other, so that an element such as a power source changeover switch, which is used  
10 in the conventional apparatus, can be omitted.

As will be apparent from the foregoing, the charging apparatus of the present invention is constructed to make the vehicle-mounted charger for a portable telephone set operate in a floating state. By  
15 virtue of the construction of the charging apparatus of the present invention, it is made possible to control the charging current in accordance with a communicating state or non-communicating state of the portable telephone set and the kind of a battery pack currently  
20 used, while performing a floating charging operation. Thus, an element such as a power source changeover switch, which is incorporated in the portable telephone set of the conventional apparatus, can be omitted advantageously.

CLAIMS:

1. A vehicle-mounted charging apparatus for a portable telephone set comprising a portable telephone set and a vehicle-mounted charger in combination, said portable telephone set comprising a battery discrimination terminal used for discrimination of a selected one of plural kinds of battery packs connected to said telephone set, and an internal circuit which comprises a microcomputer for outputting information on the kind of the connected battery pack, which is inputted thereto through the battery discrimination terminal, and information on whether the portable telephone set is in a communicating state or a non-communicating state; and the vehicle-mounted charger comprising a driver transistor which is supplied with power from a vehicle-mounted battery and supplies a charging current to the connected battery pack, a charging current controlling circuit for controlling the charging current supplied from said driver transistor to the connected battery pack, and a microcomputer for receiving information on the kind of the connected battery pack from said internal circuit and information on the communicating state or non-communicating state of said portable telephone set and thereby controlling said charging current controlling circuit and said driver transistor.

2. A vehicle-mounted charging apparatus for a portable telephone set according to Claim 1, wherein the plural kinds of battery packs have the same number of

cells, respectively, and are different in capacity from each other.

3. A vehicle mounted charging apparatus for a portable telephone set substantially as hereinbefore described with reference to and as shown in Figure 1 of the accompanying drawings.

Patents Act 1977  
Examiner's report to the Comptroller under  
Section 17 (The Search Report)

Application number

GB 9225550.4

Relevant Technical fields

- (i) UK Cl (Edition L ) H2H HBCB, HBCD, HBCE, HBCF,  
HBCG, HBCH; H4L LECX
- (ii) Int Cl (Edition 5 ) H02J 7/00, 7/02, 7/04, 7/14,  
7/32, 7/34; H04B 1/16; H04M  
1/72; H04Q 7/04

Databases (see over)

(i) UK Patent Office

(ii)

Search Examiner

M J BILLING

Date of Search

4 JANUARY 1993

Documents considered relevant following a search in respect of claims 1-2

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
Y	GB 2239567 A (TECHNOPHONE) eg. See Abstract; Figure 1	1, 2 at least
X, P	EP 0479249 A2 (SANYO) eg. See column 8 lines 13-34, column 9 lines 1-44; Figures 5A, B published 3 April 1992	1, 2 at least
Y	EP 0406858 A2 (NEC) eg. See column 6 lines 29-51	1, 2 at least
X	WO 91/03694 A1 (NORAND) eg. See page 2 lines 27-30, page 3 lines 11-21, page 8 line 5 - page 9 line 11	1, 2 at least
Y	US 4634870 A (UNIDEN) eg. See column 5 line 24 - column 6 line 66	1, 2 at least

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Category	Identity of document and relevant passages	Relevant to claim(s)

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